

p.s. One of the programs that I had been working on, a VAX-11, assembly language simulator-trainer has, as mentioned in one of the newsletters, gone back to the drawing ~~board~~ board. The interesting thing for Sinclair users ~~who~~ also use the QL, is that with a little playing, if I gwt it working it could be used to emulate a sub-set of the 68000-68008 instruction set in assembly language, to make an assembly language trainer for that (to run on ZX-81 or uploadable to TS2068).

The other project I have been playing with is a text editor in GW BASIC for MS DOS/IBM PC compatibles. It will have extra features like optional 40 col. big-type display for the visually impaired, French or other foreign accents and misc. ASCII characters, etc. I have stopped work on it for a week or so but should resume again soon. It comes in many, many versions, and I am compiling them with an MS BASIC compiler.

Bill

William Harmer

97 RUSKIN STREET

OTTAWA, ONTARIO

K1X 4B6 g.15,1990.

Mr. Donald Lambert,
CRAGIST

Dear Donald,

Since the writing schedule has been delayed and proofreading, etc. even more, due to both personal things and doing more programming, I thought I'd send you some of the pages that I have been working on, of the ZX-81/TS1000 Unofficial LDOS Larken Disk I/F Manual, so you could at least take a look at it. These pages are from the Hardware chapter (and are not all the pages). As you can see from the existence of page 7-00 (chapt 7), the pages will also have to be renumbered in the final version (and also have already been renumbered and shuffled too).

I hope that this will help in your enjoyment of the LDOS i/f and disk system. If you have any suggestions or catch any errors that have ~~not~~ been corrected or caught yet, please feel free to let me know. The pages on RFI/EMI (2 pages) that probably you have already, I have found have a serious mistake in mistaking EMI and ~~electromagnetically-~~induced interference. The originals have been corrected and the correct version will appear in the final, release version of the book.

I thought that the hardware part of the manual would be most useful for you. Missing pages-7-10(dia not yet drawn), 7-6 simplified schematic, 7-8 full schematic, 7-7 parts sub. list, 7-4 picture of pcb, 7-0-n.c. These pages are version #0.884, note for future reference).

Have a good summer. Take care.

Sincerely, *Bill*



P.S. over



7-13 "

William Harmer

97, RUSKIN STREET

OTTAWA, ONTARIO

K1L 4A3

March 25, 1991.

Mr. Donald Lambert,
SNUG

Dear Donald,

Got your last letter, and was pleased especially to see that you have got the bug to start an Aerco 'Unofficial Manual'. Also much thanks for the money for costs of mailing, copying the last batches of material. ~~XX~~ As you have mentioned, mailing is expensive and must account for ~~me~~ slightly more than half of the price of this sort of newsletter, etc. material, which is extraordinary. I hope you are able to get copies on both sides of a page for sending to Australia as that does help keep weight down.

Perhaps I should explain why the material in the earlier batch and latest two don't necessarily coincide. Some pages have been thrown out, and many rewritten from scratch, to contain most of the same ideas and explanations (and usually more) but in different words and order, sometimes combining three pages into two and other times ending up with the same number of pages but more words squeezed onto them (by leaving smaller margins in the original, for example). It is like the perfectionist computer programmer who ~~can't~~ can't leave a perfectly good perhaps line of code alone, but must search for ways to optimize it in the hope of getting a big improvement, when I go over some pages to proofread them, it seems that a complete (or partial rewrite) might be better, and then of course the next page and the next, and.... But it is all fun.

The cold I have had for the last week is slowing me down on what I can accomplish, but after spending a couple of days last week doing nothing but sleeping, it seems to have broken, and I should be on the mend by week's end. Long-lasting colds have been plaguing us here this winter for some reason and everyone seems to have had an experience of one this winter.

About your Aerco Unofficial Manual, noting that it is done by computer therefore on disk, I should send you some of the material I have written (of a public domain type). ~~xx~~ Some of it was originally a simple disk file to help new users of MS DOS, other parts for ~~a~~ lessons on computers for amateurs and others intended as a catch-all text file of material out of which to build a generic disk manual or a manual for any disk system, examples of material for CP/M, UNIX, and MS DOS being furnished. It was intended as a text source file for those not wanting to start from scratch in making a ~~a~~ DOS manual of their own, and includes explanations of ~~basic~~ basic concepts like FORMATTING, SAVE, LOAD, disk types and ~~a~~ sizes, and so on. It was hoped that this material could be taken, some thrown away, some re-edited and other paragraphs 'clipped' in whole, and incorporated into disk manuals that others might want to write. It is on an MS DOS, DSDD, 5 $\frac{1}{4}$ disk and I should send it to you, at least to look over, perhaps to borrow material from, or just ideas. It might add some bulk to your manual, at least in the earlier stages, to give you something substantial to send out to inquirers, at the least, and generally cut down your work load. It is not a duplication of anything (at all, I'd say) on the ZX-81 LDOS Unofficial Manual, since that material is on paper, and this is on disk, and "never the twain shall meet," so to speak. ~~x~~ Forcing them to meet by retyping disk material onto the typewriter ~~type~~ to get the same typestyle throughout the book, or close, or typing the paper LDOS material onto disk, an equally boring task, seems ever improbable in the extreme, given that I don't like copy-typing much.

LDOS MANUAL
PAGES ENCLOSED
p2-3 - 11/2-4 NEW
p7-5 to 7-10
p10-1 to 10-6
- MORE TO GO
COME INCL.
ALL NEW MATERIAL

TODAY, Mar 25, 1991
Mar 16

TIMEX=SINCLAIR USER GROUP = OTTAWA CHAPTER

- 2 -

I talked to Dave Solly of the defunct Ottawa-Hull TSUG last week and he was sort of disgruntled I sensed with the club going down and has concluded that means that the TS era is finished. On the other hand, I have concluded, in a similar mode of thinking that perhaps the classic computer-amateur programming hobby time~~s~~ reached its Zenith only, and that there will still be room for classic computers (I am still programming the ZX-81) and amateur programming, but that the fad stage of high popularity has passed, never to return to the adult domain, and students, young and university are taking up the role of guiding, contributing any growth, much in the way of numbers, etc. to both amateur programming and classic computers. Sort of like coin collecting and stamp collecting, hobbies whose high point for adult collectors probably passed decades if not more ~~x~~ ago, (turn-of-the century?), but ~~for which~~ with a much smaller number of adults, and a large number of young people, still has a viable following. I will always be interested in computers as I have been since about 1951, but the fad for doing it, has gone the way of the hoop and stick. In writing an article recently on why people don't like the BASIC operating system of the Z-88, I started to wonder if what turned the younger generation off BASIC programming was being taught it in school. Maybe if they had passed a law against kids under 21 learning it, and taught stamp collecting in school instead, we would have a youth phobia against stamps, and an underground movement to pass on the secrets of BASIC programming! (Maybe there is something to teaching drugs and sex in schools after all, provided the whole panoply of marks, tests, exams, essays, etc. ~~are~~ are used to dry the topics out enough.)

I also talked to Larry Kenny a couple of weeks ago and was surprised to learn he has opened a shop (a machine shop?) in an industrial section of town, (across town from me). He invited me to visit him. This also means he must be operating on closer tolerances of cash flow, having to pay rent and so on, so that he has to be more ruthless no doubt about Sinclair projects that don't generate the cash or wouldn't to pay the rent but on the other hand in a slow spell for business, he might be bribed by a cash sale to adapt the LKDDDS i/f to the ZX-81 if it meant having enough money to meet the bills that were due in a slow spell, or not. I have heard of tv repair shops in town, having to get a quick service call or ~~xx~~ several in at month end so that their phones would not be cut off, and the after Christmas, winter-time seems to be a good time for small businesses to get cash-short. He may also have got a favourable lease for a short term like one-year, since so many local businesses have gone bankrupt and many down-sized, in the last year, that there are lots of places with vacant premises for rent. On the way to my part-time job I pass a whole shopping centre that is largely boarded up, and the biggest of the ~~existing~~ older stores ~~in~~ it, the one not boarded up, is operating under bankruptcy-reorganization provisions in trying to get on its feet again (it had difficulties in the chain in Montreal real-estate). I am sure that if I wanted to, I could rent ~~xx~~ a temporarily vacant shop on a month to month basis and peddle Sinclair computer products or something the way a lot of shops have been setting up and shutting down with surplus or household junk, or book remainders, or 'hobby businesses' that have little longer term chance of making it. But their would be little point in it. Sort of like having a vanity press publish your autobiography. Fun. [^]Take your mind off your troubles for a while. But with most people, not exactly a promising start to a career as a writer.

Larry did say he had a cheap Osborne CP/M computer and had been playing with the Aerco CP/M (actually RP/M) system, and noted its disk format RP/M is not the same as any of the other CP/M formats. He also talked of how CP/M programs may make a call to a function that needs the file translation table on a CP/M disk and this means that when I try to run my CP/M software emulator, Z80MU, on 16M and using MS DOS disks, I get a "call not supported" message. I tried half-a-dozen file compression utilities for CP/M on the Tandy 1000 IBM compatible using Z80MU, CP/M emulator, and never got a pair running, (one to compress-one to read, or uncompress), using the MS DOS disks, and I guess that explains it. So there

.....is a further project for me some day when I get a computer running that will handle Z80MU (my Tandy 1000 is not fixed yet), to explore disk format incompatibility and CP/M calls with emulations of CP/M. Seems that the file compression programs/decompression/compressed file read/ etc. seem often designed to ~~x~~ translate from one CP/M file ~~to~~ on a CP/M disk to another CP/M disk, so that trying to use a RAM disk or an MS DOS disk, on an IBM compatible causes it to just bomb in most cases. So there is a ~~further~~ further pet project in that too, getting a program in BASIC or FORTH or Pascal even to do data compression that can be used in any computer, orphan, MS DOS, whatever, and doing so in source code. FORTH would be best ~~but~~ due to its speed edge on BASIC but I know virtually nothing about FORTH. Maybe now is the time to learn. "Computer Language" magazine has FORTH featured this month and says part of the SPARC operating system in SUN workstations ~~was~~ was written in FORTH and then compiled. I have heard similar claims for arcade games and the ZX-81 ROM itself

I did start out writing a data compression program in BASIC for MS DOS that used the diatom principle. It takes certain frequently occurring letter pairs, and compresses them into one code, such as the codes above ASCII 127 (bytes starting with most significant bit =1, or 127 available codes if you don't touch hex FF used as a marker in many programs, systems). Of course the ZX-81 isn't ASCII but it does have unused codes (would they make the computer crash?) and it does have the inverted letters and numbers, 36 possibilities or more, making for 6 letters codable into ~~xxxx~~ diatoms, (for example, e, space, i, o, n, s) and use the ~~xxx~~ never encountered "ii" for "th", so that "io", "o", "i", "is", "ie", "ei", "ne", etc. would be examples of simple ~~xxxx~~ pairs of letters that could be easily compressed so that they would use one byte, (one of the inverted letter or number codes) rather than 2 bytes, the code for "I" and for "O", for example. However, after a lot of fiddling I concluded, 1) little compression seems achieved, 2) BASIC programs running to do this are much too slow, 3) such programs are damnably tricky to write - I spent a long time getting bugs out of mine. So in the end only the pack programs in several variants were written, ~~xxx~~ only in BASIC* and only for MS DOS, but the end result, after a lot of work, the prospect or a lot more work and too slow and impractical a program at the end except for very special uses. Maybe though doing it in FORTH would solve the ~~problem~~ since doing it in machine language, even if you end up trying to use a universal-enough routine to convert to any microprocessor, ~~xxxxxxx~~ easily, limits it to very advanced amateurs to perfect, and they could introduce incompatibilities while rewriting it, and so on. (4 some 2-80 M/c subroutines were tested)

Larry did mention that the TS2068 desktop publishing/spelling checker was pretty well impractical to complete anymore. But he did say that he would like to finish the TS2068 RS-232 design and get it out the door, but that it would be a number of months yet. It would be interesting to visit him at his shop so I'll have to go sometime to see it. He is still taking mailorders at his old address in the country, (where he lives of course), he reassured me, and he has lots of TS2068 LKDOS boards to fill orders with.

I hope that your friend in Australia will find the material you send him of mine interesting. However it is still in a state of flux, with large parts still being rewritten as the ambition strikes me, and it is a big question if a really final version will ever be released. Make sure he understands that what he is getting is a draft, not completely proofread, corrected, reviewed and certainly not finalized. It seems better though to get it out now in pieces, than let it sit in the filing cabinet. I have been sending stuff to Geo. Chambers of the Toronto group but I suspect he is snowed under in work in organizing the Neighbourhood Watch crime prevention program in his place, and my stuff is probably ending at the bottom of his in-basket these days as a result. (Crime and unemployment has even gone up in prosperous Toronto, a lot of people moving there looking for work, after factories closed after Free Trade, and other economic practices, and finding instead the temptation to steal. There is enough government here with people getting in sight of retirement (especially the early retirement the govt. is pushing), that people don't give a darn, since employment may soon not be a concern of theirs but retirement. With reduced incomes on retirement though they spend little and many move out of town so that that hardly buoys up the local, small business economy these days.)

TIMEX=SINCLAIR USER GROUP = OTTAWA CHAPTER

- 4 -

But that means to me that I would be much less tempted than any other times when even the temptation is small, to set up a small business here. I do worry about Larry though. Barring something totally unexpected, I would expect the population of this urban area to notch down gradually over the years; there is just no longer the money ~~here~~ being made here to support us all. I certainly would be loath to leave Ottawa after all these years but can't see myself bucking the trend for ever. But Larry could just move back to the buildings on the farm physically. What would happen to his business temporarily would be a sort of ~~hi~~ hiatus I guess, but never disappearance. Anyway he says business is booming and indeed for something like his robot manufacturing device with the price so low, it makes sense for anyone doing that sort of manufacturing to get wet with Larry's technology, and build it into their systems at an early stage, rather than buy competing but vastly more complicated and terrifically more expensive things, when every company's accounting department is going over budgets for anything new looking for things to cut out or downgrade, etc., (or substitute more reasonably priced items, like Larry's).

So that's it. Glad ^{or well as enclosed} to get your letter. I shall have more LDOS manual pages on the way shortly. And before I go, to answer your question, I have ^{had} version 0.32 of the "Tips, Tricks, and Techniques of the User Group Masters, for ZX-81", and it has 36 pages, many not proofread, but that is the way it is sitting in the file. You said that you have version 0.14. ~~I think~~. Lots of things to get around to correcting in there I can see just flipping through the manuscript. In fact I will just white-out a mistake I see now, "Moterhboard" instead of "Motherboard". Must be lots of things like that, but then a lot of the writing for it must have been new and it just got shelved uncorrected. I shall look at what can be done towards getting it in shape to send out. It may take a while. (After working on it a bit and reorganizing the pages to allow proper combination with the new pages added in the last few version changes. I find that probably it would be ready to go as soon as proofread, at least, once, (partially) and corrections made. It still is not a finished version of course, but the version 0.33 that I have been working to get ready, ^{all in all} looks better organized now that the pages are completely renumbered. There are still some technical points that I should add before a final version, after version 0.33, (perhaps well after), with new writing in extra pages. I looked at the postal rates for Australia a while ago and remember that they were steep, and in the present form, it would not quite fit into the 100 gm. category, not ~~without~~ without reducing pages, or whatever (100 gm = 3 oz plus a bit I think). If say, I were to mail a package to your friend in Australia, would it be wise to reduce it more, to finer type? How young are his eyes? I have reduced some newsletter stuff to the point that some with vision problems, or maybe not even that, have said that on the few pages using an elite typewriter rather than the normal pica (12% difference or more), it is just one step of reduction too small to put it into ~~5 1/2 x 8 1/2 inch pages~~ 8 1/2 x 6 3/4 inch pages (roughly a long bond, legal size, 8 1/2 x 14, folded in ~~half~~ half to make way for a page on each half of the paper). Reducing is a good way to make things cheaper to mail and I once thought of putting 4 tiny pages on one page of the newsletter, (the front pages of other group's newsletters), and if any were good with a magnifying glass they might be able to read more than just the headlines! Such extra-reduced copies make nice souvenirs or can be used to make nice graphics of several newsletters fanned out, say previous issues, for a front page of a newsletter, and do it without having to take a photo, as I originally did for one TS Bulletin.

Anyway, let me know if Tony is interested in the ZX-81 Tips, T & T of The User Gp. Masters, and if reduced copies are okay for him, altho' I don't think you would want them any smaller than 8 1/2 x 11 (reduced 87% typically to restore margins, that's what I have been doing).

Take it easy anyway.

Sincerely, *Bill*

H.C.O.S.N.L.

Supporting Low Cost Computing

Hone Computer Orpahn Surgival News Letter

WILLIAM HARMER
97 RUSKIN STREET,
OTTAWA, CANADA
K1Y 4B3

Apr. 25, 1991

Dear Donald,

Enjoyed your letter, newsletter (Classic TS Computers, CTSC) and thanks much for the bucks towards my expenses. I am in a bit of a quandary about what to do next in the support of classic computers and club activity in general. Our local club has folded (Feb. was the last meeting) although they plan to ~~xxxxxx~~ keep the BBS going for a while ~~x~~ longer, maybe even a whole year if there is no equipment failure and it gets lots of use.

I talked to Dave Solly and he was discouraged and a little peeved and said that TS is just ~~x~~ outdated and now IBM clones is where it is at. However, I responded, equally peeved, that hobby computing of the amateur BASIC programming type was more likely what had passed away as a mass and adult hobby, and would remain a hobby for students and only a few adults, much like building crystal sets went from mass participation, to kids and very few adult hobbyists. (I met one here who takes ~~them~~ crystal sets hiking and I have been drawing some schematics for him for fun. He is a firefighter by profession.). I would hang this on several things, the first that the IBM PC programs are getting too big and sophisticated for anyone to be able to launch one as a hobby source of income unless they have a lots of free time (like a school kid, doing it as part of a school project even) and to get the bugs out of them and update them is a big, time-consuming job and soon becomes boring. Complexity and sophistication of programs has gone way up. A computer program that asks the user, "Where do you want the margin set on the left on the print out?" while considered extra-sophisticated to ask at all in the golden age of amateur programming is now considered primitive, trash in that it doesn't show you in WYSIWYG form, Windows, etc. how it is laying out the letter, and allow you to move the margins at will, respacing the text quickly as you go, etc. etc. ..and that takes weeks of programming in the evening to do and is only a small part of the whole wordprocessor that you may be trying to write. Amateur programming has retreated to quicker to write and more modest utilities to fill a gap left by the commercial companies, even though that gap will probably be filled quickly anyway by simply adding the feature to the next ^{commercial} version, cutting out the little guy quickly. The other thing is that with the greed (money) and glory (popularity of your program you may write) motivation gone, even though common sense and a little experience shows the average amateur that these were dreams as realistic as those of winning the lottery (one Bill Gates to 50 million hackers out there world wide, sort of long odds!), there is little motivation to do much more than experiment. ~~xxxxxx~~ And you can experiment with programming as easily on a ZX-81 as an 80486SX clone, on a Commodore 64 as a Sparx clone, and with FORTH instead of an expensive C compiler, and so on. As for a program for your own use on an IBM PC, by the time you get it written and working, probably you don't need it any more. People who really use databases or spreadsheets buy dBASE or at least PC File, a Lotus 1 2 3 clone or something, rather than run off to the computer room and start writing one in BASIC from scratch. (I did promise to put the volunteers at a local food bank on computer ^{about} three years ago, and after scrapping the first ~~form~~ four attempts and starting from scratch, I think this time I am going about it the right way, but maybe the food bank, with its government grant cancelled, will not survive to see it, if I get it done before Christmas - the current time schedule!)

Ask anyone who has never used a pre-IBM clone, pre-16bit computer to program in BASIC and they will ask, "What's BASIC, is that like MS DOS ...?"

For a whole, new generation, computer literate does not mean being able to program, or even knowing what programming is. ("Machine language, yeah, we took that, but I'd have to look it up in the back of the textbook to see what it is ...?") That of course has a bright side for those who support classic computers in that getting a nuts and bolts knowledge and programming them and hacking the hardware is if anything better done on an old orphan computer or classic like the Timex-Sinclair's, than an Apple Mac or IBM clone, rather than handicapping anyone using a classic. And it certainly can be cheaper done. (If I want to experiment with a BASIC programming problem or algorithm, the slower the computer, often the better, since you are trying to make the computer program faster, or at least fast enough, and if you write bloated, slow code and run it on an 80386SX clone at 16MHz, and then try to sell a program using that code, it will come as a complete surprise when you are flooded with letters of complaint that even hunt-and-peck typists have to slow their typing down to let the computer process each keystroke, etc. when they run the program on their 4.77 MHz 8088, partial PC clone, like a PC Junior, or MS DOS 1.25 computer!)

But the question of how for me (or us) to best support classics or orphans is one I shall spend the summer mulling over. A local Commodore 64 user called me up cold and we got to talking. He thinks the Commodore 64 is getting close to being orphaned. "RUN" has been sold, another newstand mag for the C-64 has folded, modems are selling mailorder for the C-64 for \$25, all the typical symptoms of impending orphaning. His concern is that we get some of the expertise and tips and helps that user groups and their newsletters would otherwise provide down from archiving for posterity ~~if~~ for no other reason. More practically, ~~fix~~ I think they should be put down for the new users, largely students that we notice are coming into the orphan-classic computing world. Anyway, my "Tips and Tricks for the ZX-81" book is an attempt to do just that, and I am glad that you requested it, so that it got me moving in adding more to it and trying to proofread and better fix the redundancies and other editing problems. I had sort of forgotten about it. I have also discovered how to bind these books by using staples along the spine and white, cloth tape, at \$1 or less rather than the \$2+~~er~~ more for Cerlox binding (the plastic spine).

To take up your questions about the TS2068 and ZX-81 and LKDOS systems, I confess that the only way I have been able to deal with the TS2068 and its supporting equipment like the LKDOS board, in my newsletters etc. is by using the old writer's trick of writing what you know and wording it darn carefully so ~~you~~ don't go beyond what ~~you~~ know. This gives the impression that one knows a lot that one is not talking about, but like the native who describes the wheels of a car that make it go, and is asked by a tribesman what a steering wheel is, is that the same, and the instant expert tribesman, basing his knowledge on one trip to the city, ~~either~~ either stays silent or mumbles, some of the tribesman taking that as a yes, others as a no. So with all of eight minutes experience using a TS2068 ~~and~~ (at Dave Solly's apartment, three years ago) until finally he said, "Let me do it or we'll be here all day..." I can really only pass on what others tell me about this, and what two people tell me, if I put it together, may not quite match! (and end up in a misunderstanding). With that disclaimer up front, here goes anyway, :-

I visited Larry last week, and asked about LDOS boards, and he said he had lots and would still fill orders, and saying that reached into a box and held up a handful of bare boards, ~~about~~ about a foot long and 7 inches or more wide. He may have still some LDOS, ZX-81 boards, less than a half-dozen anyway, but when I proposed that he give them to the club, when it was still running and lined up a club member to assemble them and test them, he said he couldn't do that and gave as a reason that they need to be set up with an oscilloscope before being used and that was too tricky to trust to anyone but himself, and he would only ship boards to people as a special favour, assembled, etc., if and when he had the time, which he does not have now. He had a good number of boards which he shipped to Vancouver, to Insomniac electronics, ~~the~~ chap still being a member of the VSUG gp., but the boards ~~seem~~ seem to have been

tucked away somewhere and the whole thing forgotten. At one time there was a fair number that Larry sold to Jim Horne, ~~but~~ and ~~am~~ Larry only kept a few back, perhaps in case of warranty or something.

About using two drives with the LDOS ~~xxxx~~ board, I think Larry once said that you need to wire in a few extra components or something. I have never used a 2-drive system and have not explored it, ~~or~~ written on it.

As for using an eeprom with the m.c. to interface a board for the TS2068 to the ZX-81 instead, I think you would have to make a lot of changes. The documentation for making these changes would largely be in Larry's head. Reverse engineering is very trying, and the little that I had to do, schematics in one hand, disassembled LDOS listing in the other and half-a-dozen open technical books rotating around from table to lap to floor, and the hard thinking and checking and rethinking -- well it made it an experience that I am not sure I would like to repeat. Certainly hard work, frustrating, etc.

Some questions to ask, though about sources of incompatibility: Does the LKDOS system use sectors and ~~xxxx~~LDOSx because the LDOS system uses blocks. The routines for saving and loading sectors are quite different from those used for saving and loading blocks. Unless by some coincidence you arrange the sectors to hold as much (about 2K) as the blocks in the LDOS system, and use then only the first sector for each track, and then there would still be problems ... plugging an LDOS ROM into an LKDOS board, would seem not to work.

Does the LDOS system use the same port addresses for control and load and save as the LKDOS board? If not, then there is an incompatibility there.

The TS2068 saves its programs at a different address than the ZX-81, and in fact, the ZX-81 uses a fixed address as the starting point, 16509 while the address of the first TS2068 BASIC instruction floats, varying with the amount of RAM used for the display file, and floating on top of it. To find the start of the program you would need to query the system variable (2 bytes) that gives the address of start of BASIC in the TS2068 when operating in the mode, of the moment. Storing the BASIC start address as a fixed number versus having to retrieve it from a system variable location obviously would need a different m.c. routine. So you might be able to get the LKDOS interface to work on a ZX-81 if you specified the ~~start~~ ^{start} memory addresses you wanted to save, like in a snapshot save or code save as it is called in ZX-81 LDOS. Then there is the end of the program. Is it marked or found in the same way for a ZX-81 program as in a TS2068 one? Again, without them being the same you would have to find this yourself, or save all of the memory even if it was half vacant, ~~usingxxxx~~ in order to use the code save.

The TS2068 uses ascii and the ZX-81 a completely different code. This may effect the way m/c is written in the DOS, a character that would make sense to use in ZX-81 CODE so that it would not cause the operating system to crash might cause it to crash in ASCII (the space character in ZX-81 is control character in ASCII; the ZX-81 CODE \$ is the ASCII control code CR = carriage return, which is one code that will cause things to bomb if it is in the wrong place if any will).

The more I sit and think of possible incompatibilities the more I find others that may or may not actually cause problems. Of course if someone is willing to try to do this, great. But at least some parts of the eeprom m/c would need to be changed to get it really working well, and maybe a lot. I just don't know. But, to quote a Chinese saying, "Man who say thing is impossible should not get in way of man who is doing it." If you or anyone gets into trouble doing it, I would assist at least up to a point. I would really like an LKDOS board to fit my ZX-81 for myself. I mentioned to Larry that he should do it and he said that we are dreaming to think that he will ever do it. It seems to come down to too little money in it and too much work and he has no time for anything but his robot work with his machine shop anyway, these days.

Just for fun I will enclose a photo of Larry, that perhaps I could have back, taken last week outside his new machine shop. He wanted me to take some photos inside too but I did not have a flash with me. When I mentioned the

conversion of the LKDOS board to the ZX-81, he said that I should do it. But he is far too busy these days to give me any assistance, and I might need a lot! His next priority after turning a bunch more of his robots out for a trade show in Montreal, is a new accessory for it which will take all ~~his~~ his software and hardware time I understand. So I shall say ~~no~~ no more and just see what develops.

Also I shall work on getting the disk ready for you. But I shall try to get this out quick, so you can see it as soon as possible. I am glad you are interested in the disk of generic DOS info. It looked like it might just go to waste. Also, I am thinking of going CP/M with a Commodore 128. So all the newsletters etc. ^{are} ~~xxxxxxx~~ being reconsidered here. I am having to come to terms with the fact that my long term unemployment can't be allowed to continue. This summer looks like it may be a turning point.

Looking at the "Tips and Tricks...ZX-81" starts me thinking that it is not really a complete or well-rounded story and that much could be added to it, ~~ext~~ ^{from} the version that you have. Perhaps I shall spend some time doing that too.
*(I don't find typing hard; ~~xxxxxxx~~ my work just ^{looks} like I do!)

Sincerely,

ALC

TS Bulletin

Supporting Low Cost Computing

William Harmer

97 RUSKIN STREET

OTTAWA, ONTARIO

K1Y 4B3

July 7, 1991.

Mr. Donald Lambert,
TSNUG

Dear Donald,

The work here is progressing at an uneven rate, since I do it when I feel like and what I feel like, so that to get maximum out of my time, A lot of things get done that can't be sent out because they are not checked, or corrected, or have missing pieces. An example is the disk of generic DOS documentation, which when I looked at the files for it, seems uncorrected and rough and spread over a number of separate disks and records. In addition, the latter work on it was done before my only computer that had 360K disk access, MS DOS, went down and now I can't get those files off the disks, since my borrowed system only reads/copies 320K MS DOS disks reliably, and will fail to read a file on the 360K disks at all if it is not in the middle of the disk! Even then it may put some garbage into it. However I will continue to work on the problem. Also have been doing a lot of writing this summer and wondering if I should launch a new newsletter aimed at school students (the group most interested in orphan computers as new users, coincidentally), so I can get further exposure to some of the articles already written as well as some new ones. I enclose a sample of one, the Li'l Computer Wwzzz (of Wizardry). Trouble is it will be too expensive to distribute in paper so maybe disk form will be better. A shops version emphasizing computer hardware more, is also planned but in paper form due to the illustrations. It should give both the already-written material and knowledge gained in the TS world a new audience.

I replied to Bob Swoger's article about writing a TS article for TSNUG newsletter in the affirmative and await his reply. I don't know if the Toronto group will pick up and copy my TS Bulletins this next issue. I plan another of the 8 page, photoreduced TS Bulletins for this year, like last, and have a lot of possible things to put in it. Since business is slow, maybe I can get a deal on getting at least the middle section printed. When shop owners come out of their shops and chase you down the street when you just look in the window, and have a nice chat and so on, you know that business is getting slow! The Canadian government seems resigned to 9 to 11% unemployment, even though that means a lot of people are ceasing working (and retiring prematurely). Since, they only register for a short time as unemployed and then cease adding to the 10% in the statistics as they are dropped off. Such funny bookkeeping means that we may never know the true unemployment figure here in this recession, just as economists could never untangle the figures and lack of good figures for the depression of the 1930's either here. Sort of "Alice And Wonderland" stuff! Anyway that means that I am looking for ways of saving money even if it means writing stuff without publishing it immediately. But I am learning a lot of things too from the amount of television I am watching. My French is getting better and better, since when there is nothing interesting on in English, often something interesting is being broadcast in French. Also I am sitting through a lot of educational tv on all sorts of topics including university economics recently and have been reading a couple of economics books bought at a neighbour's garage sale. It does puzzle me where the economy is going, if anywhere. (The one economics course I took in university I seemed to do pretty well in but a lot of the subjects on a course are just boring if you spend a lot of time on them.)

So I shall continue writing and publishing even if the publishing is a little delayed due to waiting for the articles to come together and get corrected. Take care. I shall keep sending stuff that seems to go together on paper and

try to get someone to transfer the 360K disk contents to 320K. I don't like to use the computer where I work part-time, since I don't think they like me to and I am affraid of giving it a virus, since I get so many of my ~~disk~~ disks "public domain". That is another reason I would like Larry Kenny to make a double-density disk interface-LKDOS- for the TS1000, so that I could read and browse through disks without risk of getting a virus or spreading one. The LDOS system I have is only single density and can't according to Larry read a normal DSDD disk no matter what you do, and having tried it I am inclined to ~~not~~ agree. You get patterns of numbers, but nothing that makes any sense, and incomplete tracks too, probably due to the limited ~~buffer~~ ~~length~~ length. Anyway, I ~~shy~~ haven't heard from Larry for a while. Maybe some day if I can borrow a car, I will go by his place again.

Sincerely,

Bill

Aug.5,1991

Completed and Mailed Aug.11,91

Mr. Donald Lambert
T/SNUG

Dear Donald,

It is a long holiday weekend here and I have found the time a little long. Yesterday I tried to get the generic disk material I promised you into some sort of order and the machine ate my work. Darn! EDLIN the MS DOS editor has done the same thing to me so many times, that I shall have to be a lot more careful setting it up at the start. I tried saving the edited copy to the RAM disk, except EDLIN normally renames the old, unamended file as a back-up file and then saves the amended file as a whole new file and of course there wasn't nearly enough room left on the RAM disk to save all that. There is supposed to be a switch to avoid saving the back-up and I shall have to see if it works with this, early version of EDLIN, and remember to use it when I am working with the RAM disk. But I did work with it enough to realize that the file in question does need a lot of editing, lines too long and a whole lot of semi-irrelevant padding. (version sent got rid of padding, but stary lines still there.)

I have got my ZX-81 working again, changed the board inside the moveable-key keyboard and the disk drive works well with it but not the cassette interface, which works sometimes but not others. I have to use the cassette interface since I can't use the ZX-Printer and disk i/f at the same time, probably due to power supply problems. I did get the direct video connection so that my composite amber monitor works with it now. I had forgotten how much fiddling can be involved in working with tape. Maybe I shall attach the 3½ inch drive Larry sold me, but I need to make a connector to mate the pin-connections on the 3½ inch drive to the edge connector for the 5¼ inch drive, that comes out of ~~xxxx~~ LDOS disk drive interface. There is one ZX-81 program I shall work on though - the one to enter and alphabetize a series of entries to make a book index. I have the program started and several sessions of work done on the programming, but it is a lot of work, more than one would think. Another project is to design a super-simple BASIC, suitable for use with a small board Z-80 project. I have tried to start the project before with three different, and conflicting plans about how to do it; features the compiler should have, in order to be very simple and yet useful to a programmer. It will be a major project since so much machine code debugging takes 10 or 20 times longer to get working than BASIC. But the index program is the priority now. Maybe I can enter it in the programming contest. How many will enter a ZX-81 program anyway? (May not be a lot of competition!)

But I will get to work on editing the disk manual material on disk again, as soon as the discouragement from the last session wears off. I originally couldn't find the file. When I tried last time to load it from disk, it turned out to be a bad save and wouldn't come off. Last night at least I found a good copy of it, rather than the miscellaneous assortment of files I thought I would have to put together to make the file up for you. I am trying to get any disks I have to mail and other stuff off before too long. The postal employees are planning another strike. They don't usually amount to much, but only a week or two at most before the government takes action, but it is nice to get stuff out ahead anyway. Government employees are also planning a strike so that will mean hard times for a government town like this one where the government is the employer of ½ or more of the workers here. And a bus strike too. So there may be quite a bit of transportation chaos here in the next month or so! (Postal strike could start as soon as Aug.20, but likely intermittent.)

I don't know if my letter to Bob Swoger has had any effect as far as getting any arrangement to write for T/SNUG N/L settled. Maybe you have been talking or have heard from him. The most discouraging thing, as you have found out, in not having the publishing/printing under your personal control is not knowing if or when articles you submit will be published. Perhaps submitting a regular column according to a time schedule is the answer.

Another thing to think about is bundling. I belonged to an Amateur Press association once, the AAPA, and they had all their members send their little home-printed booklets, or single sheets to one central point, from which the club Mailer, mailed out a bundle of one of each to everyone submitting anything and other members. With us, since no one hand prints their stuff, it could be even simpler, in that just an original or good, dark copy need be sent to the mailer, and ^{from} that person could also make the requisite numbers of copies. Now, everyone pays first class postage for each newsletter they mail, and sometimes oversize or overweight rates. A central mailer gets a ~~xx~~ cheaper rate from the post office, by arrangement and sends out a monthly envelope regular as clockwork, only one postage payment per month. It involves more money being handled by one person, and more dealing with the postoffice, photocopy shop, and making sure the bundle is within certain parameters, but the saving in postage which is almost half the cost of my newsletters for example might make it worthwhile. There is some difference with the AAPA mailings in that everyone's letters or booklets were physically small (if you have ever hand set type and hand printed anything on letterpress equipment you would know why, the effort and expense of doing large pages and typesetting lots of words, made it tons of work to print very much). ~~The~~ ^{Another} advantage is that even if some only produce a piece every second month and some only a few times a year, other than the thickness of the mailed bundle varying on a random basis for this reason, the folks on the mailing list get something every month, altho not necessarily from the same newsletter issuers. Maybe it is too early ^{a phase} for this in the decline of the TS club system, but as a last resort at least, it might save many newsletters from folding prematurely due to simply being worn down by postage expenses and feeling that a one-page newsletter, even if it is ready, is not enough to justify mailing that month, by itself, while including it in a bundle would be worthwhile. Anyway it is an idea to think about.

Getting the ZX-81 working again, made me think of improvements. One thing I have already started buying parts for is a new powersupply, since the old one, based on 6.3 volts rms does not seem to have the 'juice' for the ZX-Printer and Disk drive interface. I shall try next a 14 $\frac{1}{2}$ or 15 rms volt, centre tapped transformer ~~one next~~ and also will try to buy some CMOS Z-80's to cut power drain. ^{to} I had to keep unplugging ~~the~~ the power jack to clear RAM of spurious contents, & reset on lock-up with the many bad loads from tape. Perhaps an on-off switch in the power line using a mercury switch to avoid semi-conductor damage would be best. How much current can you get mercury switches rated for I wonder. Also one of those useless keys on the movable keyboard unit on the right should be converted into a shift, for the right hand side of the keyboard too. Then what about an LED pilot light (or even a current meter?), and maybe a combined shift-function key (need only two diodes?). Then what about a switch to cause the computer to boot into a custom ROM chip holding your own personal program? Well, let's start with maybe moving the shift key lines over to have both a right and left shift, and maybe think about the rest! Still haven't got the ZX-81 eprom burner kit built. Laziness seems to be the reason and buying too big, once expensive interface chips for it, which seem more reasonably priced today. Then what about an RS-232C? I even have some design ideas for a very slow and primitive one using no input/output ^{chip} chip. It would be easiest though to connect the LDOS interface to an RS-232C voltage shifting chip set (1488; 1489 and a MAX-232 to get the voltages if you are loath to design a custom psu of a simpler kind. That would be the easiest

(One I have is only 100ma.)
Not enough.

way for us, LDOS disk interface owners. Of course you would have to disconnect the disk drive while using it and connect the RS-232 add-on board instead. I wonder if I could make one with an edge with fingers that the disk drive edge connector would fit right on? You would need some custom machine code software though, but you would need some machine code software specific to your RS-232 hardware if you used another ~~design~~ sort of design of your own anyway. The 6850 can be programmed to accept a variety of stop/start/parity bit combinations per byte-frame and the baud rate of the disk i/f board is set at 125KHz if I remember. If you didn't like that, you could divide it off the chip, taking every second byte, and pushing it through your own shift-register. I wonder if just doing it at all would be feasible, even the simplest way. A former member of the ^{server} user group, had a whole bunch of little interfaces for the ZX-81 that she got I think from a salesperson. An RS-232, Centronics and I think a couple of other interfaces. All in cute little black metal boxes and meant to hang off the back of a ZX-81. It was quite a collection. It meant little to me at the time since I knew of no reasonably priced accessories to connect to the ZX-81 that would need them.. (The ZX-81 accessory market just fell off about when these accessories came to market, rather than building up to include all sorts of ~~this~~ packaged deals like printers, etc. to make use of them following their release.)

So you see with all the impending strikes here and the high unemployment I may have a lot of leisure in the next month or so ~~to~~ to work on personal projects, but the main one I have been putting off of a technical nature is language study. I think I am more likely to find money in technical writing/translation than in soldering iron wielding/computer programming of shareware, etc. I have a bad feeling too that this "recovery" is only a pause on the way down for our economies here. Certainly people here who normally got jobs have been affected more than before, ~~the~~ summer students that got jobs for example, being laid off after only a month work rather than getting the whole summer. My nephew is pumping gas this summer again and worrying about the high price of college text books (\$60 he tells me ~~now~~ now). And I thought I was blowing the bundle on a two-volume in one reference book when I went to university and I just checked the price inside the cover this minute-\$14.25! I suppose now-a-days, it would be \$140 or more! ~~Maybe~~ Maybe my next computer will be a non-IBM one. I just seem to dream about what I want next, and the computer appears, like the one on my desk now. Of course one has to have modest dreams for this to work. And the dream may have to be helped on by a bundle of cash from your own wallet, but my association with fundamentalists has taught me there is some truth in this approach. I remember a friend, on the way to a medical, check-up

in another ~~town~~ city, for workman's compensation, stopping at a town he didn't really know why he stopped at and going into a store he didn't know why and talking to the owner who sold him a used camera or lens for his hobby/business that he had just enough money with him to buy..... And he had been wanting that item. Strange but true. ~~He said~~ That seemed to happen to him more often than chance would seem to ~~be~~ be able to explain. It's all in the Sermon on the Mount I guess. But my problem is not the next computer but the next job. Funny, something like that just happened when I was lacking the money to photocopy my newsletters and the manager said to use the shop photocopier, and I did and have sent out already a newsletter with a page copied on that machine, at the shop. (Since it is a family firm, not my family though, a word from the manager is company policy!) So that helped get a few more copies out until the copier ran out of the few blank pages in it. (Then there was the loan of the boss's Cadillac one day when they had no place to park it securely since a family member was out of town. So I even had a chance to see how it is to drive a Cadillac.) The saying about clouds having silver linings is perhaps a good one and people miss seeing the silver linings perhaps because they are waiting for gold linings only, ~~the~~ ^{which seems to be} the second part of that ^{rule} in reality.)

Anyway, I go on and on. I shall see about the disk for you though. (I did some editing of the disk, but the end seemed to drop off, like it will only take so much in the way of bytes, ^{that is} EDLIN, that ~~is~~ MS DOS editor). I can send you the rest some day. Because of this I call it Part I (only). Sincerely,

But only about 1000 words would be missing at most.

P.S. Well I ran a wire on the ZX-81 from ^{the} left to a spare key on the right, and I notice since delete is shift & delete key, it would be easy maybe with the right diodes to make a one key delete beside and to the right, on a vacant key, of the present delete. A one key press, shift+delete=true, one-key delete. Key top snapped off easy to put the "shift" label on it too. It is also near the enter key, & shift-enter=function. Maybe just being near these keys used with it is good enough and saves hunting for the shift key over on the left.

Trying the 3½ inch drive was an adventure-bought a cable from the local Steales IBM compatible store & plus the power connector, plus adding a slot (key-way to the LDOS interface board), I got some results, though no saves I could retrieve and garbage in directory. Larry gave me a single-sided 3½ drive, so maybe that is why it doesn't work with the built-in LDOS operating system. Fun anyway. I guess I need to write a BASIC program with m/c, LDOS ROM calls to use it. The arm seems only want to move ½ way to the centre of the 3½ inch disk. Have got it working with 5¼ inch drive though-problem must have been dirty pcb contacts (finger tips)

TS Bulletin

Supporting Low Cost Computing

Aug.22,1991

WILLIAM HARMER
97 RUSKIN STREET,
OTTAWA, CANADA
K1Y 4B3

Mr. Donald Lambert
TSNUG

Dear Donald,

Thanks for your letter, donation and especially the diagnostic, ^(print-out) received today. Maybe I'll send an MS DOS disk to George Chambers for him to try his utility on. ^(a 320K version).

The print-out was most useful. Nothing was lost from sector 1 printed there to sector two (of the two printed, don't know real no.), the first one ending "exp " ...and the second one beginning "lain.." so obviously that follows on. The garbage ~~xxxx~~ is sector control codes that George Chambers' utility doesn't skip, since it skips a different number or place in the 360K disks. Once your printer starts printing any character from 0-255 (CHR\$(0) to CHR\$(255)) it is working on printer control escapes (to get ~~xxxx~~ printer control characters like shift to big print mode, condensed mode, bold, etc.) and end of file codes which apparently invoke George Chamber's program id. message, I think. These are just numbers, not meant to be ASCII or printed so that George's program should skip over them.

Sectors 16-79 are blank it would seem, since I did not fill the disk in order to make deciphering easier. You may miss material for the opposite reason than that above, George's program looking for ASCII where only binary numbers are placed to help the operating system decide where the sectors are, etc., that is George's program might skip ASCII character areas where the text is stored on the disk thinking there will be just numbers there. I don't know. But the first should be easy to fix with some experimentation, by just getting a special modified version of George's utility for 320K disks, one that skips more bytes in each sector until you get it to skip all the 'nonsense' or 'garbage' bytes, of use only to the operating system, MS DOS. Of course it is also possible that George's program extracts some numbers from this garbage to make his program run properly, but more likely, it just tries to print stuff that no self-respecting printer should try to print out! (ASCII codes 0-31 or even 128-255).

Excuse the rough work, so that I can get this back in the mail pronto. Once things settle down with the post office I shall send you more disk material although you should be able to read what I sent you now okay with a little fiddling. I saved it on disk, fresh disk, so that the text should be all in order the same as the normal sector order; no deleted material. That should help in case of trouble and isn't done on all disks.

I'll write again. Thanks again. If we can get this problem licked, I can submit newsletter articles on disk so you need not retype them.

Sincerely,

Bill Harmer

WH Computer Users' N L

William Harmer

97 RUSKIN STREET

OTTAWA, ONTARIO

K1Y 4B3

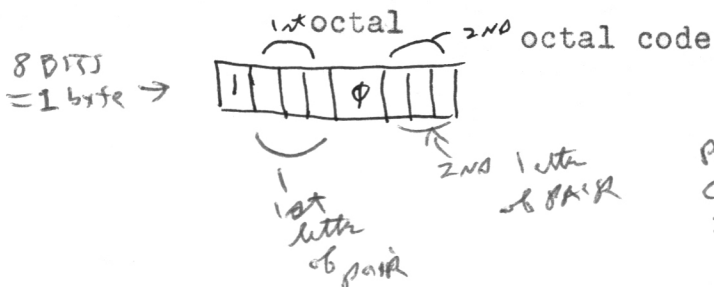
Sept. 20, 1991

Mr. Donald Lambert
T/SNUG

Dear Donald,

Have you been able to find the secret of reading the 320K disk (MS DOS ver. 1.25) that I sent you? I think it just throws away the second sector in every track, at least that is what I have speculated on having more time to think it all over. Otherwise it would seem very similar to the 360K (MS DOS version 2) disks.

I have my ZX-81 in the nice keyboard-case, new 9 volt p.s.u., (design published in my n/l a while back) and LDOS disk ~~xxx~~ system working again. With it I was able to give a final test to the m/c subroutine to code letters for ~~diatomic compression~~ diatomic compression that works with a BASIC routine, to take the letters one-by-one out of a line of ZX-81 coded (not ASCII) text and the BASIC must decide when ~~two~~ letters, one following the other (of the series, space, A, C, E, G, I, S, T) are present, and ~~xxxx~~ and the BASIC routine must take the returned USR code from m/c, a number 0 to 8 (8=no hit, not found for compressible character) and make up a compressed code, two letters to one byte. Of course with ASCII it would be lower case letters, not capitals (a, c, e, g, i, s, t) and would go Most Significant bit of byte=1 plus say 16 x the first octal code plus the second character's octal code.



The octal code goes 0=A

1=C

2=E

3=G

4=I

5=S

6=T

7=space

8=no hit found

PRINCIPLE:

CODING

2-letters

PER BYTE

WHEN POSSIBLE

When I go ahead and complete the documentation this shall have to be a part of it. And of course a m/c decode, decompress routine is needed.

Sorry about the poor photocopy. Maybe I shall be able to get you a better copy when I have more copies made of the newsletter. The machine at the supermarket obviously is getting close to needing a service call, or maybe some more toner. I can't complain about the price though. (The newsletter really is published via piggy-bank-press, that is coin-operated photocopy machine!)

Also I am enclosing a copy of page 4-3/4-4 from the LDOS manual. When I get copies, I put them aside for you until the next regular mailing. I am also working on a book of oriental translation of computer and electronics terms, including Japanese, even though I know very little of the languages. I can offer some essays to sharpen up the concepts of words in computers and electronics, as well as electronics parts pictures, etc., concentrating mainly in labelling them in Japanese. Also have started a book on power supply design—an amateur's notebook for personal use and sharing with a few friends. I even got into tube power supplies and am trying my hand at building (bending), radio chassis since I think they can also be used for projects in solid state experimentation (to mount experimenters boards and pcb's on, for example). But I have not got far with it, not knowing how to score by hand thick aluminum, so my bends are very round.

So obviously I have not been very busy here! Part-time work is slow and business is slow in general. The postal strike is now only intermittent and the public servant strike called to a halt at least for a while. Only the bus drivers' strike looms over us for the future. I hope that the mail is okay now. (Be sure to write and tell me if you don't get this!@) So I shall rush off and mail these newsletters, the first of two batches of them, to get them in today's mail. (Fri.)

Take care. If the disk exchange works, maybe I could send you more writing and newsletter articles in that form soon.

Sincerely,

Bill

William Harmer

97 RUSKIN STREET

OTTAWA, ONTARIO

K1 January 22, 1992

TSNUG

c/o Mr. Donald Lambert

Dear Donald;

I really enjoyed getting your last letter and read it over several times, finding it reassuring. I guess the thing for me to do is be more philosophical about the money spent- still I shall have to cut it way back to make room for other things in the hobby field.

About ~~my~~ your kind offer to take some writing for the ZXIR QLIVE ALIVE!, I would like to contribute some things as soon as I have time to figure out what to write for it. Another delaying factor, other than the writing in progress for my own stuff is that I am not sure when my IBM compatible will be fixed. I have a part on order. The other IBM compatible was repossessed by the bank, the food bank that is, when they got a manager that is computer literate-the old ones weren't and hence did not need the use of the computer. Meanwhile I have tuned my mind into thinking and writing and working on Japanese and German language learning. (Japanese does not seem as hard, at the beginning of studying it, where I am than one would think, I am finding.)

About the German, that is getting some practice since my letter and newsletter exchange with the German Sinclair QL User Gp. I have been writing a 21 year old chap, who must be smart because he uses a lot of big words in his articles in their magazine (typeset, cardboard covers, over 1000 circulation I think), and when I got a copy of the Dec.1990 magazine, I just spent several hours devouring it, as I do the odd time I get a German computer magazine-(it also takes me about an hour to start understanding it at all)- and had lots of fun, in other words.

The magazine seems to have fairly long articles like the one on "Better Programming" (of QL in machine language, discussing alternative routines), as well as short ones. Speaking of long, an article entitled "BACK and FORTH" has 3800 words in it alone, in my estimate, equivalent to about five pages of my reduced size TS Bulletin! (If you add a Table to it). Europeans believe in lots of reading material per article -- I have been criticized when I used to publish only 1 page, 900 word or so articles in the TS Bulletin of having long articles! It also has new software reviews, news, hardware tips with diagrams, a few ads, including one for a hardware QL emulator board for the Atari ST (at about US\$360, from Uwe Fischer, a company in Hamburg). This firm also sells a CP/M software emulator for the QL for about US\$45 and a hard disk, 40 Mbyte for US\$1050 approx., altho these are one year old prices, remember. I still have a lot more reading and struggling to understand these articles,,as my knowledge of German is not too good

Note: You asked about the LDOS-ZX-81 system. I don't do wordprocessing on the ZX-81, although I would like to find out how to modify it so you can type fast enough to use it for that. I use it for saving programs only now, writing and sometimes running them, but make experiments with programming.

The lack of MS DOS computer for the moment has in addition to putting off contributions to ZXir QLive Alive!, delayed the completion of work on the Hobby Computerists' Almanac 1991-2. The computer also ate a long article I was working on, shortly before it was returned to its owners. So there is work there too. Also I would like to extend my ~~xxx~~ electronic/computer topic publishing to a few booklets in a more educational mode and simpler concepts explained more clearly. To that end I got out an old physics book to see what energy was, to explain it, and it is not easy to see what it is surprisingly enough. I also found that I never understood properly the meaning of 'work' as physicists define it and the fact that these definitions are completely different than their ordinary meaning, is something worth explaining through these proposed booklets. It also helps with translation, since so many translators of technical material need clarification of the concepts that the words they translate refer to. So it will help with my translator's reference book, which, on looking up the file, I see I have progressed very little with, compared to what I thought I had.

All this reading and writing and I haven't touched a computer in weeks, except perhaps the one at the Epilepsy Association where I am working as a volunteer occasionally. (I am trying to figure out dBASE IV there.) Reading, writing and now more drawing than ever, as the more finished version of the Cabling Hints page from the LDOS, here enclosed, shows. Some of pages possible to include in TS Bulletin #1-92 have been written and others planned, but final release is a while off.

People must wonder "what book" I get some of the article material from, and the lists of points and ideas in some articles. Well, it is though thinking and also little bits of experience and info cobbled together from various sources. I have been reading, physicist Richard Feynman's book, "Surely You're Kidding Mr Joking Dr. Feynmann", which tells of the wild and things he has tried and technical tricks about mental arithmetic etc. and found it so funny and instructive. One thing that hit me was about publishing any conclusions, that one should publish your doubts, possible criticism of your conclusions and the way you reached them also, both for others and for yourself, since, as he says, quite rightly when you think about it, the easiest person to fool is oneself, since one wants to believe the article is ~~xx~~ true and useful. That is a lesson perhaps I should take to heart in my off the top of the head, articles. Also his criticism of science and math text book writing as a pile of vague, partly wrong examples and often useless ones too, teaching things that no scientist or mathematician would want to calculate or need to, and wondering how any kid can learn anything from such a mess that these books are, has motivated me to try to produce some clear and good technical writing, on at least a few topics, even if it takes much more care to write that way and a lot more work. When doing it the regular way comes too easy, perhaps it is time for me to move up to the next level of difficulty in writing and explanation. (Also I think my drawing is improving, although I am spending little time on it.) So maybe next, the newer articles I shall write in the future shall be trials of ~~xxxxxxxx~~ using better techniques, like the above. Doing things like adding qualifications/explanations at the end of an article and tying it in to the rest, seamlessly are two different things however, and that will be a challenge indeed!

Anyway, I hope you enjoy the enclosed.

Sincerely, Bill H.

William Harmer

97 RUSKIN STREET

OTTAWA, ONTARIO

K1Y 4B3

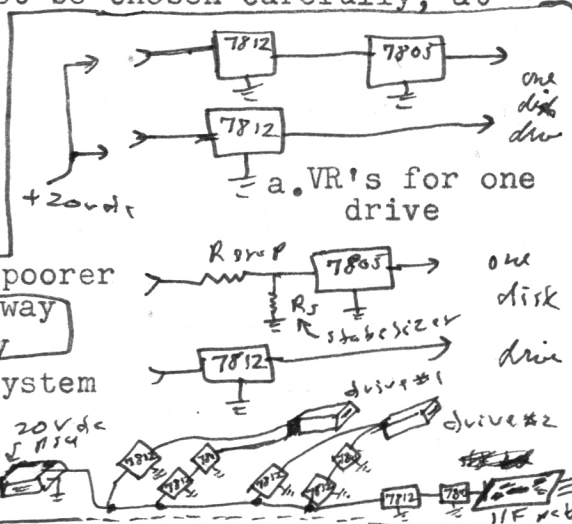
Feb., 3, 1993.

Mr. Donald Lambert,
T/SNUG

Dear Donald,

Thank you for your newsy letters. It is interesting to have some of the questions raised that you mention, and it has motivated me to do more digging into the documentation. That may result in some new learning that leads to useable material for future newsletter articles, for which I am thankful.

The voltage regulator question is the longest standing and, with any electronics design problem, there are several possible approaches. If you are trying to drop to 12 and 5 volts from 21 volts of the battery charger transformer, at least for the 5 volt supplies, I would recommend using a pre-regulator, like the 7812 ahead of each 7805, as well as a second 7812 for the 12 volt supply. Putting a 7812 and 7805 in series like that will split the power dissipation between two TO-220 devices, something important it has been almost doubled by drawing 5 volts from such a high voltage supply (14 vac/21 volts dc when filtered). Another alternative is putting a power resistor in series with the 7805, (on the input side of the 7805, rather than the output), the same place to put the pre-regulating 7812, see diagram. This would not work as well and the resistor value must be chosen carefully, at 6 ohms, at 15 or 20 watts. That still means that no line of the circuit in which current passes through a 78XX, can carry more than $1\frac{1}{4}$ amps, so to use more than one disk drive, you need more than a 12v and 5 volt line for all drives, but separate lines for each drive. If two drives, you need two 12 volt lines, each with its own 7812, and two 5 volt lines, each with a 7805 and resistor, or recommended, each with a 7805 and 7812 as preregulator. This is the sort of multi-line, one regulator per line (if no preregulator), one set of lines per drive, that Larry used on a linear psu that he sold me for the LDOS system. It does not use such a high voltage transformer and it does use a massive chunk of aluminum for the heat sink, but it does work, even though it gets plenty hot.



Alternatives, that are slightly more costly, include using higher current carrying voltage regulators, like the TO-3, LM323 which will carry 5 volts at 3 amps and the LM350K, which will carry any voltage, set by a resistor combination, so you could set it for 12 volt output, also at 3 amps. These voltage regulators cost about \$3-4 these days which is not too expensive, except if you already have a bunch of the 78XX ones, you may not need to spend any money at all. Radio Shack used to sell LM350's, at one time. I bought an LM323 from Active Components, a mailorder firm in the USA and Canada which also has a local store within walking distance (on a nice day). Anyway, I have enclosed some doc out of the National Semiconductor, Linear ic. manual (a thick little book, about telephone book thickness for a fairly big city's telephone book).

The last TS Bulletin (#4-92) was issued in a rush, embarrassingly, with lots of proofreading mistakes. One place even neglected to include the intended change of "our College" to "our local community college", so that it would seem to imply without the change made, that I am a staff member or student at a college, neither being the case of course. Lots of other mistakes and even blanks where last-minute insertions were not inserted mar the issue, but I was determined to get it out in case I decided not to issue any more in the New Year, since every year I say to myself, this is the last year. In fact if the Vancouver group had not sent postage last summer, I had asked them if they were using it still, as the Toronto group stopped mailing it in with their newsletter, due to the fact they were up to their maximum number of pages for US mailing under the same postage rate, and receiving no reply by a month or so. I was starting to announce quietly that the last issue of TS Bulletin had been mailed, although of course reviving it would be possible,

on an intermittent basis when I was bored and had nothing to do. The postage stamps sent, did however kick my enthusiasm back into gear, and postage for the end of the year was covered. With me it is the time that is the problem, not that I don't have a lot of free time (I certainly do), but I wonder if I should be using it for something of a higher priority, like finding and preparing for a job. So even though, with the monitor breakdown, the 12 page issue that was planned did not materialize, since program routines intended for it (float sort routines mainly) plus a final INKEY\$ listing (INKEY\$ substitute routine in m/c), could not be tested another look at it found enough material, that with rejigging could be put into an 8 page newsletter, in some haste, to go out (at least some copies of them) by Dec. 31 to keep it in last year. Now, however, having given up on giving up newsletters, I am working on TS Bulletin #1-93, likely 8 pages, and am fiddling with a m/c INKEY\$ substitute for the sort of number-only entry that the DOSDOC routine could have used to avoid the BREAK key problem.

Speaking of DOSDOC, you seem to have a later version than mine, Version 2.1, 1987 compared to my version 1.04 of 1986. It also stimulated me to produce my own utility to add in one program, some of the things that I have thought of and some published in the LDOS manual, like the one-sided disk format, REM statement POKE, etc., in other words, things not representing much of a duplication of DOSDOC features. But in looking at DOSDOC, I see loops that run far too slowly (the analysis one for example) and which could be simply speeded up by a little tweaking just putting the main loop at the front of the program rather than at the end. Otherwise it runs painfully slowly and does not save its results! Anyway, on using it, I found a disk that I could not read any more, had track 0 replaced on it by track 79, accidentally. I hope that it was not DOSDOC that did it, screwing things up further than they were to start with. (It seems to zoom past the 'which track save as?' question by an INKEY\$ glitch or poor query design like WordPerfect, I am not sure.) So I may be tempted to include better versions of some DOSDOC features too.

About the question of your typing my articles up, to put them on disk, and the question of Bob Swoger not wanting them reprinted, probably because they are not fresh or new, perhaps both problems could be solved by getting me to retype/rewrite some directly onto disk, so you won't have to bother and they will be new and more Sinclairized versions. I could put them on a 360K DSDD 5 $\frac{1}{4}$ inch disk, IBM format, and then you would just have to take it off on the TS2068 and juggle the material a bit, into TS2068/Tasword or whatever, format. Just tell me the articles wanted and even line length, so I can reformat the lines in the final version to suit that. Anyway, give it some consideration. One of the things I promised you on disk ran into a snag, when the file got too long, and would not come off disk, exceeding the file length available to the word processing software, or something.

LDOS boards are no longer available from Larry who is swamped with robotics work, and is definitely out of TS work now completely. Some LDOS boards ended up in Vancouver, perhaps with the group, when Larry sold the LDOS part of his line to Jim Horne, whose Late-Night Electronics (or something like that) went apart in some chaos, the Vancouver group trying to pick up some of the pieces and solve some of the customer complaints over order screw-ups. Another problem: the 9602 i.c., if I have got the number right, is not easy or even possible to obtain anymore. Attempts to organize an Ottawa-Hull project to assemble LDOS systems were all lined up, before the club went defunct, but Larry was not willing to go ahead with it. (We were going to get the boards from him, and then it seemed when the board supply was in Vancouver, it seemed they had disappeared there too, and no one wanted to get into that problem all over again there and so no one wanted to look for them, I can only guess, there either. It is as if no one with the boards wants to get involved, either selling the boards bare or looking for them.) So getting an LDOS board seems to be a matter of getting one used, of the 50 or 70 boards out of the 100? blank boards made, that were assembled and sold. As for the pot adjustment, the $\frac{3}{4}$ turn refers I would think to a multi-turn pot, and either repair or pressure to deliver with no multi-turn pots available likely led to misfitting the board you mention with an ordinary pot. Maybe it was one of those made in Vancouver by Late-Night Electronics, or whatever it was called, a little too late at night. The way to go on this would seem to be to do what the NE Florida group did and try to get some bare Aerco boards from Aerco, with ROM's, and sell them bare or try to get someone to assemble them here or in the USA. That is the board I would choose, for the simple reason that double-density would allow reading MS DOS, etc. disks. They sold them to the Florida group as a mass purchase for about \$100? (I forget) each.

Moving right along, I would say that I am getting into disk drive operating system theory more and more and came across an Atari single-density drive hacker book, which has much interesting to say, if a little cryptically, assuming you know a lot already about the system. It was $5\frac{1}{4}$ inch, SSSD, with sectors, which means that with a similar system used with LDOS, disk capacity double-sided, could have been brought up to the equivalent of about 197K from 154Kbytes, and a much more fancy and general DOS operating system could have been used. They split the routines into a command i/o which interprets commands and executes them, and a Serial i/o routine, which handles block i/o from buffer to byte-at-a-time level (to the disk controller's one-byte data registers, one for input, one for output), and this Serial i/o routine worked for disk and any other serial i/o. It would work from a group of systems variables, an i/o control block, and so it could be reused, with different parameters, for all sorts of different i/o hardware, printer, cassette, disk, RS-232, and possibly joystick, separate dumb monitor, modem, you name it, avoiding having to rewrite completely new variations on i/o routines, for any of these different accessories. This layered, or modulizable approach is quite interesting. Theoretically, with 128 or 256 byte sectors, you could put two in the 2K RAM buffer of the LDOS board, and still a lot of m/c routines to change the DOS to your own type, making the LDOS system a disk loaded DOS version, rather than a ROM based one only, and increase the disk capacity too, to about 190K per disk. You would have to put two ordinary tracks on the new format disk, with LDOS 2K track form, but after that you could have the rest of the tracks on a sector system, one track, a normal, or pseudo-normal LDOS directory and the other holding the new DOS m/c operating system, for initial loading into RAM. But shrinking a DOS down to $1\frac{1}{2}$ K bytes from the existing lean and mean LDOS that takes 2K, including space for system vars, subtracting from the $1\frac{1}{2}$ K DOS size, would seem an unattainable goal, even if $\frac{1}{2}$ K is left transient (sometimes loaded into the ZX computer and other times erased, and still only on the disk). But all this is day-dreaming, and you can have a daydream in ten minutes, that would take thousands of hours of hard work to realize. This sort of designer-eye-view is educational to take, nonetheless.

Answer to question: Larry is at: Larken Machine Automation,
1756 Bantree,
Gloucester, Ont., K1B 3W4 -(613)749-9558

according to our new telephone directory, just put this January, same shop as before. About the single-drive disk-copy routine, let us just say that I talked to Larry about that many years ago, and he gave me some help and suggested that I write a routine to do it. Unfortunately it is not easy at all, since there is no place to put the m/c routine you would have to write to do it, that would work with all systems under all situations. So eventually I gave up and just recently put some more thought into it and decided that writing one or more routines for different situations would be the only approach, or putting some trick into the system. In short, the result would be tedious to use too, since you would need to shuffle the disks, in and out of the computer from 316 times, worse case using one system to three times, to transfer just one file per disk. The other approach is to give up completely and make a program to transfer only a number of files from one disk to the other, files that would not exceed the RAM capacity of the computer if all in RAM at one time, in other words, useful for copying a number of small files in the same number of steps (plus one) that you can transfer only one file, using LOAD, and then SAVE, and switching disks in between. Even that would be a hard routine to write, or at least time-consuming and tricky to plan, if written for a variety of RAM expansion sizes, file sizes to handle or reject, etc. In the meantime, I have other ZX programming projects to work on for the next newsletter so I will just put it into the background and continue thinking about it, before trying anything.

I have started the new disk book, to be general floppy disk systems for any computer, and double-density especially. Much material has been written and collected for it so far but organizing it and filling in the gaps will take time. I would like to get a rough version out soon however. (It will be paper only). Big work! Also written recently is an article on electronic parts which combines specifics of practical use, with historical and theoretical explanations, and though it will fit into the subject matter of no computer newsletter you might like to read it. If you do publish it anyway, against my advice, please slap a copyright in the public domain, 1993, notice on it. It is not proofread either. Your comment on the economic problems in Japan seem similar to the terrible state in Canada, which also

is very export dependent, and a sort of industrial overload for the world and the USA as to raw materials and energy too. These economic problems mean two things for hobbyists, scarcity of certain parts, like the 256K RAM chip price skyrocketing that killed Larry's interest in TS products and cut the money flow long enough at least for him to move onto other things, (likely, I don't know of course). Replacement and repair parts for our computers and whole suppliers are going out of business, and any delay in ordering anything in this economy may find the item no longer available, and the business closed or gone on to other things. (Also it creates a few opportunities, where former suppliers like Sunset Electronics in San Fran., dust off their boxes of TS books like the ZX-81 ROM disassembly, and try to push them for a little business, since business otherwise is so slow everywhere and folks have more time to fiddle with things normally not economic. So missing this opportunity to order from people like them may find you ordering when they have no stock or have put it back in the basement, and like Sunset El., before, are only willing to sell by the box-full, because they are busy again.) Some public domain disk mailorder places have disappeared, a big Canadian IBM PC one I wanted to mention in a newsletter, proving out-of-business, when I called first to check. (If you call and they are out of business, out of service that is, you don't have to pay the long distance call, but if an answering machine is on the line, it may leave you guessing if that is the right number or if they still are doing ZX business and annoyingly, some take more than one minute to come up with a beep to leave any message, not that they would call back if they are not the right place or in the business you are looking for. Leave a mailing address instead? Perhaps that is an idea.)

Second problem is that the local and Canadian places that used to manufacture tv's etc., from scratch and were locally owned or often US owned even, no longer being around, the lovely surplus parts that experimenters used to be able to buy are hard to get. If you want to do a project with a Japanese made audio amp ic, you will have the problem of getting documentation, or any mention of a project using them in an electronics magazine (except from Japan? At least you could read the schematic! That might be enough.) And to get the part, if you can get it, might be \$15 each, buying two in case there is a problem, makes electronics the hobby of kings again, or eccentric wealthy people. The US made ic's are getting old now, as so much of the sort of audio ic designs, etc. hobbyists like, are made in the orient, with Japanese i.c.'s only. Motorola invented many of the tv ic's but they are 1970's technology now. To make a project, say a monitor interface for your computer with modern chips, you would be looking at a Japanese tv schematic and pricey Japanese replacement market prices, and guessing how to take the circuit you need out of the schematic and make it work on your own board for your own board, guided by guesses and technical subtlety rather than specific docs. I once got some Hungarian magazines from a local deli, and sure enough, could look at the pictures and schematics, and US made part, part-numbers (Cold War still on then), sort of figure things out, not knowing much about the very complicated Hungarian language, not any more than I would know about Japanese, that is dictionary in one hand, puzzled look while scratching head with other hand. So one can do amazing things, sometimes, with little to go on and other times the problem is not soluble at all, even with all the docs in the world. That's electronics. You can open up something not working and either find a wire dangling or a part obviously burnt so that it can be fixed easily, or scratch your head and take every measurement with every piece of equipment you can think of and never get it fixed in a year, or ever. Anyway, it makes the hobby more interesting when we get thrown these curves all the time, as times move on.

As I get things to send you, I should be sending more, especially if some of these writing and programming projects get any where. It is getting late in the winter however, and that means that soon my attention will turn from things you can do indoors, where it is warm, like computer and electronics and writing, to other things and looking at some of my programs, I see the pattern, of late Dec., Jan., July, Sept-Oct., as well as Feb., as the time I do programming. I also have to find a job and at my age and this economy, when locally about 1,000 have been let go in the high tech, especially electronics industry (or layoffs announced for), in the last month or less, I have wisely given up on computer programming, electronics or writing of a technical sort, for job prospects, and indeed did so some time ago. I will be focusing on different things. Appreciate your friendship.
Your pen-pal, Sincerely, Bill H.

P.S.

I see I left unanswered your question about how the line A500 was put in the DOSDOC program and how it was saved with DOSDOC.BU, rather than .B plus a number. The are both seeming mysteries since they seem not possible to enter by keyboard monitor in the normal way, and of course they can't be. DOSDOC.BU is not entered by the LDOS keyboard monitor/command screen but put in the REM statement of a running program, after RAND USR 14336, so it goes that way. The line number was likely entered as line 9999 and then POKE of the line number changed it. This is explained partially in the book, "Mastering Your Timex-Sinclair" by Hartnell & Jones, and is a copy protection/anti-piracy trick. A young student at our club figured this out and experimented with it and gave a short talk on it, that I understood little of at the time. Apparently there are limits to how high a number you can use. The A is like the hexidecimal A, (I think). If you try it with a test program, one with only one line, so you know any POKE of the line number will be at 16509 and 16510, you can experiment yourself. For example:

```
NEW
10 REM NICE TRY
```

```
POKE 16509,40
```

```
LIST
```

★ I think some numbers won't list and some won't run, and all sorts of mysterious things can happen with high line #

on screen will be A241 REM when you LIST

I think there was an article on it in Syncware News too, or somewhere similar.

Then there is the question on RAND USR and PRINT USR (as well as LET X=USR 14336, and a few other ways may be possible, of which I am not sure about). The simple reason for using RAND USR is when it is used in a running program, it will not PRINT anything, even 0, on the screen, and possibly cause a halt on error 5, no more room on screen. Using PRINT USR 14336, means you should precede it with a CLS, so this halt will not occur. Some of this is in my LDOS manual, I think, in the part on adapting/using programs with LDOS disk access.

LDOS passes a 16-bit integer (0 to 64,535) to BASIC when it returns at the end of the machine code routine, as do all m/c routines. This number is the contents of the Z-80 microprocessor's BC register, at time of exiting the m/c program, that is, at its end. This is a peculiarity of ZX-81 BASIC, which is carried over to TS2068 and Spectrum BASIC also, but should not be expected in all Z-80 based computers. LDOS passes either zero or usually a track/block number. So, if you type in PRINT USR 14336, and the last disk operation before exiting the command/screen of LDOS has a problem at block/track 79, then 79 is the number passed to BASIC via the BC register of the Z-80. What will BASIC do with this? It will do whatever it normally does with a number passed to it, in the case of PRINT, it will print it, just like PRINT 12 will put 12 on the screen, (if there is room). The nice thing about RAND USR 14336, is that RAND puts a number in the seed of the Random number generator, which is in effect one of the numbers in the formula it uses to make random numbers (pseudo-random numbers actually). This is marked in the table at the back of the ZX-81 user manual, systems variables, as SEED, at RAM location 16434. So, in effect it passes this number that LDOS puts in the BC register and passes to BASIC to an unseen, internal process of ZX-81 BASIC, where it will not get in the way. If you never use RND in the program, it will never be used, and if all the programs you run in using the computer that day never use RND, then it will be quite harmless. If you do plan to use RND, then you just put in a new seed first in your program, as the manual talks about, but of course it is sort of higher math. So RAND USR 14336, simply avoids any problems with returned parameters causing unexpected results to the BASIC statement the m/c was called from. But what if you want to know, and don't want to use RAND USR either? You could use something else, like LET X=USR 14336, which will insert the number, track number where a problem occurred, into X, without printing anything or changing the random number formula seed. Then if you want to know it, putting PRINT AT 9,0;"LDOS RETURN PARAMETER/TRACK NO.";X

in your program after the LET X=USR 14336, will let you do this after all, (Of course using a less common variable name, like LDOS, might help not get it mixed up with other uses of X in the program.)

So that should answer some of the remaining questions. The RAND USR way of calling a machine code routine is the hardest thing to understand, and it took me a long time to get it, and a club member tried to explain it to me originally. It's use with LDOS, is just another variation on the theme. The book, "Machine Code And Better BASIC", by Stewart & Jones, (another ZX-81 reference book, p.183, although that book itself, even though packed with sophisticated stuff, explained carefully, is a little heavy duty, being too much to take in at once.)

Just looking through it now, I have spotted a routine they explain, and list, that I was going to try writing from scratch, myself. Now, I won't have to. (It is a series of variations on scroll on the screen, with listings and explanations.)

Sincerely, *jsd*

William Harmer

97 RUSKIN STREET
OTTAWA, ONTARIO
K1Y 4B3

December 30, 1996

Mr. Donald Lambert,
T/SNUG

Dear Donald,

I am in the process of revising the Tips and Tricks book of which I sent you a copy a few years ago. It occurred to me that I could easily give you the material to at least up-date somewhat the version that you already have, just by replacing the first few pages with the new pages enclosed. Time has moved on and some of the earlier pages are looking dated, referring to circumstances that are no longer the case, such as much user group support of the ZX-81/TS1000. The new pages reflect this. It also reflects a new phase for the ZX-81, that of a collectible and museum piece, and it is for this market that my revised and expanded versions will be oriented more towards. But the general idea is still to help owners to get their ZX-81 up and running and find things to use it for.

I have also been working on a TS Bulletin issue but for reasons of money and fewer user groups, will likely keep its distribution down to people who write me and buy my books. I have put a copyright on the Tips and Tricks, but intend to give limited copying rights to those buying or getting directly from me, a copy. In your case, I simply give you the right to copy this version, the one you have plus the new pages enclosed, as you wish. Some day I hope to scan it all into a computer so that it can be more easily edited and more elegantly typeset with desktop publishing, but lack of money is putting that in the future. Maybe by then museums will buy it.

In the meantime I am racking my brain to try to come up with a new format and name for a continuation of my newsletter publishing activity, something not exclusively Sinclair.

I hope you are well and wish you a happy new year.

Sincerely,

Bill

Electronic Parts For Hobby Use: Antique And Modern

People who make of electronics a hobby, even those who also do it for a living have an almost unending supply of surplus equipment to play the hobby games of experiment, disassembly and analysis and of course repair. Even antique tube radios are becoming a sort of repair sideline, although you do not have to get back to the vintage of antique before running into puzzles about the diverse kind of parts found in them and the problem of identifying them and even finding like looking and fitting replacements.

Let us start with resistors. The oldest, simplest consisted of ni-chrome or other higher than average resistance wire, wound onto glass, ceramic or other forms like a coil. This was fine, except any coil starts to have inductance and the windings form little capacitors between each turn (definition of capacitance two conductors at different voltages physically close enough for their electrostatic fields to delay the flow of electrons to or from the two conductors). At this point you have the inductance impeding high frequency currents and the little pockets of capacitance bypassing the high frequency past the windings of resistive wire partially, so you no longer have a simple resistor but a complicated circuit in one component that may do all manner of strange and unexpected things, at least unexpected to the circuit designer of the radio who was counting on only a resistance being at that point in the circuit. Putting a thin metal film on a glass or ceramic tube to make a resistor got rid of the coil and some miniaturized versions on a ceramic pellet are now the standard low noise resistor for audio and other work, sold today as metallized film $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ watt resistors. Another type, the commonest in radio tube equipment is the composition resistor that used a plug of a mixture of carbon and filler to furnish the resistance, and since it was not a coil it was a simple resistance. Two problems had to be beat with composition resistors, the accuracy problem, which means that the worst may vary from - or - 20% of the indicated resistance and the other was that graphite carbon alone used this way is a NTC thermistor, so as it warms up from dissipated energy due to current running through the resistance, it lowers its resistance. To solve this boron compounds were added to the composition (and if you want to see what is meant by thermistor, draw a thick line on a card with a lead, that is graphite pencil and put an ohmmeter on the resistor formed by the line and watch the resistance go down as it warms up slightly). Today you may see a few newer pcboards with resistors painted on by resistive compound, much like our pencil line resistor just described (but with boron). Inside silicon chips of course resistors are needed, the small value ones formed on the chip by treating the silicon and the higher value ones replaced with one to three transistor circuits that make up constant current sources, since silicon chips are too small to get long resistors on.

Capacitors are even more interesting and were a big source of component failure in the days of antique radio use. Capacitors are embarrassingly simple to make and have been known to science for a long time as Leyden jars, a glass jar with foil on the outside making one plate and on the inside another. This makes for a very bulky capacitor, so attempts to raise capacitance meant putting the two plates closer together and finding better ways of making the area of foil on which the capacitance depends fit in a smaller space. Taking the foil and putting a sheet of ordinary paper over it, then another piece of foil, then another piece of paper and rolling it up into a tube was one of the first things tried, and in the days of high impedance devices like tubes, 0.001 and 0.01 microfarad capacitors could be made very small this way, although the higher voltages of tube circuits had a tendency to punch a hole through the paper shorting the capacitor as well as the wire lead to foil joint breaking off making an open capacitor (to a capacitance meter). Moisture would aid in the punching through so the capacitors were sealed in wax and later tubular capacitors were sealed in plastic. Before plastic sheets were used instead of the paper, punch through was checked by using wax, mineral oil and other possible things to soak the dielectric paper in. Eventually mica was tried and since it would not roll up into a tube without fragmenting it was used in multi-plate capacitors of square plastic or wax coated type although even Bakelite cased mica capacitors and plastic dipped ones are out there. Putting a metal film on both the inside and outside of a glass or ceramic tube evolved into putting a metal film on both sides of a ceramic button and the disc ceramic capacitor of the 1960's vintage took over from the others.

That still left a gap for high value capacitance, more than a few tenths of microfarad in other words, and that was filled by the electrolytic capacitor which is the current troublemaker among the smaller parts and more and more are used since capacitor values are higher since today's low voltages need more current handling and capacitors larger than a picofarad are too big to put on silicon chip integrated circuits. Electrolytics age quickly, drying out and losing their

...continued overleaf....

capacitance, especially in antique or vintage radios that are not used for years. In a case like that, priming the capacitor, which sometimes can be done with an ohmmeter and discharging it a number of times with a low value resistor, should be done before plugging a set in that has not been used for a while. Otherwise you will hear that terrible 60 Hertz hum or on a tv see a shadowy, vague bar climb up the screen repeatedly, telling you that the capacitor must be changed now, although you can put a good capacitor in parallel with the faulty one often, just using clip leads and watch if the problem goes away, to make sure you have identified the bad capacitor. In an antique radio, capacitors often come in the three section form, three inside one can, and two sections of about 10-35ufd., varying with the design, at a high voltage, about 350v. for the two legs of the pi-network power filter, the negative sides, perhaps even being the can in old sets, tied to ground. The third capacitor may be a few microfarads, but only at a low voltage rating (the bias on the audio output tube plus a safety margin), and this is used to bypass the cathode of the audio output tube to ground, a 50C5 in newer tube sets or a 6V6, 12V6, 35L6, etc. Some people hate tubes, usually right after paying a big amount to replace one, prices of \$50 being quite normal for some modern (1970's) tv tubes, but they are a lot more tolerant of overvoltage and other abuses of an electrical sort, while fragile if you drop them even metal tubes and even if you do not break a battery set tube you likely will sever the filament. Electrolytic capacitors are physically durable but unlike tubes which have an infinite shelf life, age rapidly and should be primed before use if in stock for a long time, as in the case of a replacement part for an antique radio.

Electrolytic capacitors hate overvoltages and will even explode on an reversal of the polarity of voltage they are designed for. Feed + to the - terminal and the blast may be worse than a shotgun, one case seeing the whole metal can go through two bookshelves into the ceiling, when one was connected in reverse polarity. Some modern capacitors are too small to do as much damage and now some manufacturers are scoring the tops in the theory that they will blow apart and not straight up, the whole can blasting off its base like a rocket. But seeing a capacitor that has started to push up beyond the point where the plastic wrap that is around most newer capacitors still covers the edge around the top and onto the top as much as usual, is still a good indication of one drying out or gone. Of course there are many ways a capacitor can fail, the electrolytics rarely shorting but often opening, losing their capacitive value (lower value than needed), starting to dissipate heat and act a bit like a resistor (power factor), and certain intermittent factors as well as the weird memory effect similar to that with charging of Ni-Cad batteries. Loss of capacitance is the commonest thing.

Simply replacing an electrolytic capacitor is the fastest fix in newer equipment, but in antique equipment there may not be an exact replacement since the higher voltage capacitors are hard to find, they are unlikely to look at all like the older one being replaced and they may be a type with unusual properties or maybe not an electrolytic capacitor at all but just look like one a bit. An oil-filled a.c. capacitor is one example, and substituting an electrolytic in an a.c. role will cause it to have the reverse polarity problem mentioned earlier and possibly explode, but certainly be ruined. A solution would be to put the replacement under the radio chassis, out-of-sight when it does not match the original electrolytic although some purists go as far as taking the old electrolytic apart, and putting new, modern and small capacitors inside the can and replacing it to look just like the original as well as working the same. As for a.c. capacitors one magazine clip talks about using two capacitors and steering diodes, but that seems questionable to the writer. A.C. electrolytic capacitors do exist, even now although in small values at small voltages and used mainly for audio circuits like cross-over networks. One final note, now that tantalum capacitors are being used instead of the normal electrolytics in higher priced equipment where size is a concern, is that they are polarized and can explode if connected the wrong way around and they are additional touchy about high current inrush and so would need a small value, limiting resistor in a power supply filter circuit for example, so tantalums are not direct substitutes for normal electrolytic capacitors.

The problem with fuses is in finding them, as many ingenious places have been used by designers to hide them. They also can look funny, the '1/8 watt resistor' may be instead a picofuse in modern equipment, and chemical fuses come in little plug-in boxes. On a higher current than average the little fuse wire will due to its resistance heat up a little. By making the fuse wire of lead which has a low melting point or putting a drop of chemical coating that will burst into flame, the fuse can use this resistive heating effect to blow faster than if made just out of a tiny strand of copper wire, the time-dishonoured trick fix. Luckily fuses are not too hard to buy in all the needed shapes and types. The problem is just that there are so many shapes and types to have in stock, from slow blow to fast blow, to extra fast flow (to protect semi conductors), big, small, in-between and even ones built into ordinary looking wires or power resistors and the little chemical type just mentioned, that come in palastick box cases. Substitution is a science.